JOURNAL OF THE BRITISH AMATEUR TELEVISION CLUB

CQ-TV No. 45

CQ-TV - Journal of the British Amateur Television Club.

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Editorial

Now that the Summer season is here again many B.A.T.C. members will be travelling around the country, and amateur television demonstrations are being organised at several large gatherings. Trentham Gardens Mobile rally saw the M.A.R.S. camera in action alongside the G3NDT/T channel, with Gordon Sharpley's slow scan equipment. By the time this edition is printed a demonstration should have been given at Longleat Mobile Rally. Also planned are demonstrations at this year's Dagenham Town Show, Woburn Abbey Mobile Rally, we hope the Manchester Electronics Exhibition and this year's Radio Hobbies Exhibition. A post card to the Hon. Secretary will bring a full list of known demonstrations with their dates and times. Another point to mention along these lines is that the Club likes to hear of any demonstrations, and will try to help out with publicity material, equipment etc. Reports and photographs for CQ-TV also welcome.

The first of a series of articles describing a complete item of equipment in each article will be appearing in the next edition. Previous articles have always spread over two or more editions, often with discontinuities between individual units.
The first of these articles is being prepared by G3KUJ and G3NDT/T, and describes the construction of a complete, self contained 405 line pulse generator. Two of these units have already been built and are working very well. Any B.A.T.C. members passing through Bristol will be very welcome to come and see G3NDT/T, although a Post Card or phone call as warning would be appreciated.

Two important announcements appear on page 9, concerning Vidicon scan coils and Slow Scan Transmission.

G3NDT/T

BOOK REVIEWS

COLOUR TELEVISION ENGINEERING
J.W. Wentworth. Published by McGraw-Hill
Price 74/-.

Chapters on colorimetry are as readable as the subject allows, both additive and subtractive colour synthesis physics are discussed, field sequential systems are treated as something other than a joke, and there is even a section on the design of filter disk sector shapes (the only literature I've seen on the latter). A good all-round colour text book.

Brian Pethers

REPRODUCTION OF COLOUR
R.W.G. Hunt (Kodak Ltd.) Price 63/-.
Published by Fountain Press.

This is basically a photographic book, so it has a subtractive synthesis slant. It covers colour reproduction in photography, printing and television (colorimetrically, not circuit-wise). A good book for the television engineer who thinks colour problems don't exist outside his own field - broadens his outlook !

Brian Pethers

PHOSPHOR NOTES

The beginner to Amateur Television often commences operations by building a flying spot slide scanner using a 931a type photocell and a cathode ray tube. The choice of cathode ray tube for this work is governed by the afterglow or decay characteristic of the phosphor used for the screen. As the spot traverses the screen, if it leaves any afterglow behind it this will be picked up by the 931a in addition to the main signal - the result is a reduced response at the higher frequencies*. When afterglow is present, the instantaneous appearance of the spot is that of a line which is bright at one end but trailing off to nothing. The duration of the afterglow is usually specified as the time taken to decay to 1% of the original brilliance, and where this time exceeds 80uS (on the 405 line system) the 'spot' will occupy one whole line of the picture!

Some phosphors have been made for Flying Spot Scanning with an extremely short afterglow, others have been made, for example, for Radar use with an extremely long afterglow - 30 or 40 seconds or longer. In between these comes the white phosphor used for television picture tubes - these have a phosphor with a medium-short afterglow, just long enough to avoid the possibility of flicker. Television picture tubes are therefore not always the best tubes for F.S.S. Many tubes have the phosphor type indicated in the identification number, and the table gives some details. It should be noted that although the P7 phosphor is classed as a long persistence one, it is a two layer type, with a blue 'flash' and yellow 'afterglow'. As the response of the 931a is near a maximum in the blue region and very small to yellow this type of phosphor has been used sucessfully for amateur F.S.S. use (3FP7, 5FP7 etc) However, the yellow afterglow layer is between the blue layer and the glass and this does give the resulting picture a grainy appearance. For further information see 'Time Bases' by O.S.Puckle (Published by Chapman and Hall) also Electronic Engineering, Aug. 1949 - an article by G.F.J.Garlick.

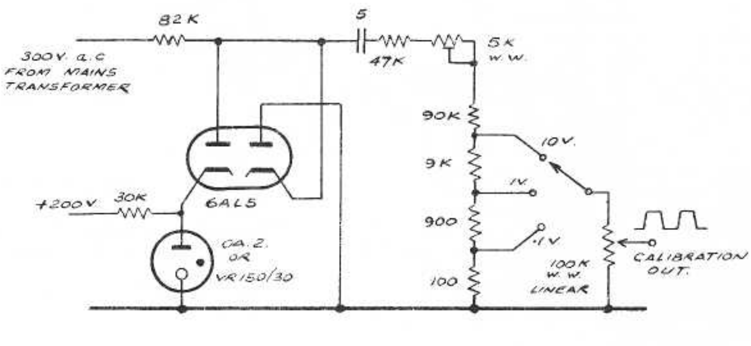
* D.S.Reid will be publishing an article on Afterglow Correction in CQ-TV 46.

Type	Colour	Persistence	Use
P1	Green	Medium - 40mS	Oscilloscope
P2	Green	Very long	
P4	White	Blue component 5mS Yellow " 60mS	T.V.
P5	Blue	Short.	F.S.S.
P7	Blue/Yellow	Long.	Radar,
	useful for amateur F.S.S. and slow scan .		
P11	As P5 but less bright with shorter decay.		
P16	Blue-Green and Ultra Violet	U/V exceptionally short.	
P24	As P15 with extra red. Used for colour slide scanners.		

This is not a complete list, but gives a guide to those in common use. Thanks to Wilson Allen, K9JYO for some of the details.

C.G.D.

For checking levels ----- Gordon Sharpley, G3LEE, sends in this simple oscilloscope calibration unit. Fed with A.C. from a mains transformer, and about 200 volts D.C., the unit gives out a square wave calibration signal. Accuracy is dependent on the 100 ohm, 900 ohm, 9K and 90K resistors. Some accurate reference is necessary for initial setting up.



COLOUR FUNDAMENTALS

For the amateur, colour transmission is possibly one of the few worthwhile things left to do in television that has not been done already by the professionals ; in Europe at any rate there is still no regular public colour television service. There is therefore plenty of room for experiment, and this article may, we hope, give something to go on with.

What is colour ? One of the textbooks says "colour consists of the characteristics of light other than spatial or temporal inhomogeneities, light being that aspect of radiant energy of which a human observer is aware through the visual sensations which arise from the stimulation of the retina of the eye " - which may or may not make it all quite clear. Fortunately most of us know already what colour is, but to transmit colour by television we must be able to measure it, and translate the information into the form of a suitable electrical signal.

Now, "as every schoolboy knows", every colour can be built up from a suitable mixture of suitable primary colours. Notice the word suitable. This is most important - a little carelessness here may land us very quickly in serious trouble. Here's how - suppose we want to build up a perfect match for a pure colour say in the blue-green region of the spectrum, from a given mixture of red, green and blue. We expect to be able to write out a relation of the form

X = a parts of red + b parts of green + c parts of blue.

So far so good. But we may find that in this particular case no amount of fooling about with our coloured lights will enable us to get a perfect match, though we may be able to get pretty close. However we find out, perhaps by accident, that if we mix a little red light with our unknown, we can match this new mixture quite satisfactorily with a mixture of blue and green. We have, using R,G and B for red, green and blue, that

$$X + a(R) = b(G) + c(B)$$

and assuming that ordinary algebra applies to this weird and wonderful equation, we write

$$X = b(G) + c(B) - a(R)$$

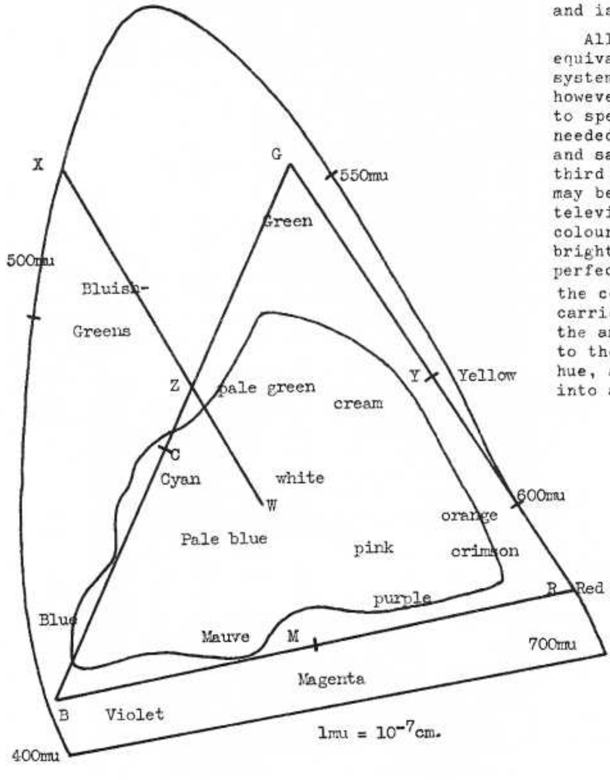
which at first sight means that we need a NEGATIVE amount of red light to add to our positive amounts of blue and green to make a perfect match for the blue-green sample. This is of course nonsense, but in spite of this we know what it means, and we can use these nonsensical equations quite happily. Nevertheless, negative amounts of light in this sort of equation do have a certain nuisance value, but we find that we can minimize the range of colours for which they occur by choosing the primary colours as far apart as possible - hence of course the choice of red, green and blue. At risk of turning away some of the cash customers, I must emphasize that these three colours I mention are the three used in colour TV, though specified in fact more accurately than this by wavelength. These colours are the colours needed to build up the widest range of colours by mixing coloured lights : the more you add, the brighter the mixture becomes, and the 1:1:1 mixture is white, as you would expect. Now here is where the confusion may arise - for films, paints, dyes and so on we have a different set of primaries, the complementary colours of our red green and blue, which are in fact a blue-green shade called "cyan", magenta and yellow. The more of these you add, the darker the mixture becomes, because these pigments operate by reflecting only the wavelengths that make, say, yellow look yellow, and absorbing the rest. Here the mixture with equal quantities of cyan, magenta and yellow will be black. The pigments used in inks and films depart so far from the ideal that they look, and are sometimes called, red, blue and yellow, instead of their correct terms magenta, cyan and yellow.

Okay, after a short pause to wait for stragglers, we will proceed. Back to colour television : it is encouraging to note that colour TV starts out with a considerable advantage over pigments in painting or photography, as far as range of possible colours is concerned. Figure 1 illustrates this. R,G,B, represent the primary colours red, green and blue, and C,M and Y the "secondary" colours cyan, magenta and yellow, found by mixing equal amounts of the primary colours two at a time. If we mix equal quantities of all three primaries we get a point W representing white, slap in the middle of the triangle, and similarly all the other more or less subtle pinks, pale yellows, creams amd oranges can each be represented by its own point somewhere on the diagram. We could get quite a fair idea of which colour lies where by taking a piece of white board or card and cutting it to the shape of an equilateral triangle. Then fix a red bulb to one corner, a green to another and a blue to the third, switch them all on in a darkened room, as see how the colours on the board gradually shade into one another. This is a very crude and simple experiment, but I'm still rather naive about making a yellow out of red and green. (It works!)

All right, that's enough fooling about in the dark. If you look at Figure 1 again, you will see that there is a horseshoe-shaped curve outside the triangle ; this is the curve we get if we work out what values of R, G and B we need to match each spectrum colour in turn, plot these on the diagram, and join 'em all up, finally joining the ends of the horseshoe with a straight line on which will lie red-blue mixtures like

mauve, purple and our old friend magenta, which do not occur in the spectrum. This horseshoe is called the "spectrum locus". All real colours lie on or inside it, just as all the colours we can reproduce from our RGB mixtures lie on or inside the triangle RGB. The area between the triangle and the horseshoe requires negative amounts of one or more of our primaries. The mysterious X we mentioned earlier is one such colour ; the best match we will be able to achieve with our primaries if we exclude negative amounts of light will be Z, where the line WX joining X to white intersects the triangle. Since our colour TV receiver uses real primaries which must be always positive (or at worst, zero) we won't be able to reproduce colours outside the triangle, but will reproduce instead a distorted colour on the edge of the triangle, like Z.

In case this worries you, look now at the irregular curve which lies mostly inside the triangle, Inside this curve lie all the ordinary colours that occur in nature, in vegetation or animals, or in the fabrics and materials we normally meet in the TV studio or out of doors, so we have little cause to worry. And because the eye is much more sensitive to. and critical of,



$1mu = 10^{-7}cm.$

slight errors in hue at some parts of the diagram than in others, we find we have done rather well, and the apparently large area BXG is not as serious as it looks.

I'd like to end up with a couple of definitions, based on our very useful colour diagram. So far we have been quoting the position of a colour on the diagram by quoting the proportions of R,G and B in the colour, but there are two more convenient ways of doing this. At the moment we are only interested in colour and not in the brightness, so we need only specify two of the primaries, as we put white = 1 and so R + G + B = 1 always. In fact we can go better by drawing the whole diagram out on ordinary graph paper and, as usual, quoting coordinates x and y, which are themselves simply related to R, G and B. The other possibility is to use polar coordinates, with white as the obvious place for the origin. Then we can specify any colour we like in terms of the distance of its representative point from the origin, a quantity which we can term the SATURATION or PURITY (zero for white, increasing as the colour moves outward, away from white) and also by stating the direction in which this colour lies from white, with reference to some standard direction. This is an angle of so many degrees, and is called the HUE.

All these alternative representations are equivalent, and we can pass freely from one system to another as we please. Notice that however we do it, we need always two quantities to specify the colour ; R and B - G is not needed since G = 1 - (R+B) ; x and y ; or hue and saturation. To these two we must add a third signal for luminance or brightness, which may be a perfectly normal black and white television signal, syncs and all. In the NTSC colour television system, this is done : the brightness information is transmitted as a perfectly normal monochrome TV signal, with the colour information added on an additional carrier at 3·579545 Mc/s (525 line system) ; the amplitude of this carrier is proportional to the saturation and its phase depends on the hue, at any point in the picture. We'll go into all this next time

A SLOW-SCAN COUNTER

TIMER UNIT FOR SLOW SCAN T.V. USING S.T.C. NOMOTRON DECADE COUNTER TUBES

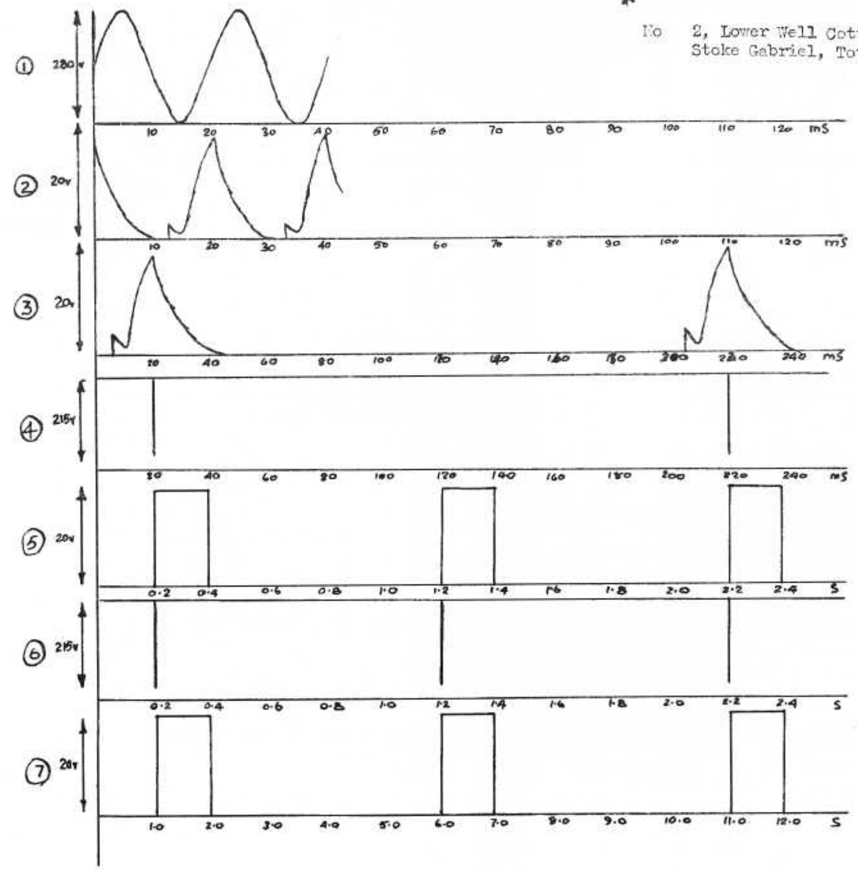
by D.L. Jones, Grad.Brit. I.R.E.*
G3LYF/T.

In this article I propose to describe a circuit for a timer unit which can be used to produce line and field pulses for a 125-line slow-scan raster. As no fixed standards for slow-scan work have been agreed on so far, it is left to the individual users of the circuit to reshape the output pulses to suit their own requirements. Slow-scan television itself is a relatively new subject to me; in fact I began to take active interest during a recent visit from C. Grant-Dixon in April. Thus any new information relating to the subject would be appreciated. Would all intending correspondents please note the new address of G3LYF/T given at the end of this issue of CQ-TV.

The Nomotron tubes employed in this circuit may be obtained, complete with their special sockets, from Messrs. Proops at 30/- approximately. Before beginning the description of the circuit it is felt that some explanation of the principle of operation of these tubes may be worth while.

Referring to diagram number one: the tube consists of ten specially-shaped cathodes which are brought out to separate base pins. They are spaced equally around in a circle, and between each cathode is another specially-shaped electrode known as the transfer electrode. Around the cathodes is a cup-shaped anode together with a shield to limit the glow discharges to discrete areas.

* No 2, Lower Well Cottage, Stoke Gabriel, Totnes, South Devon.



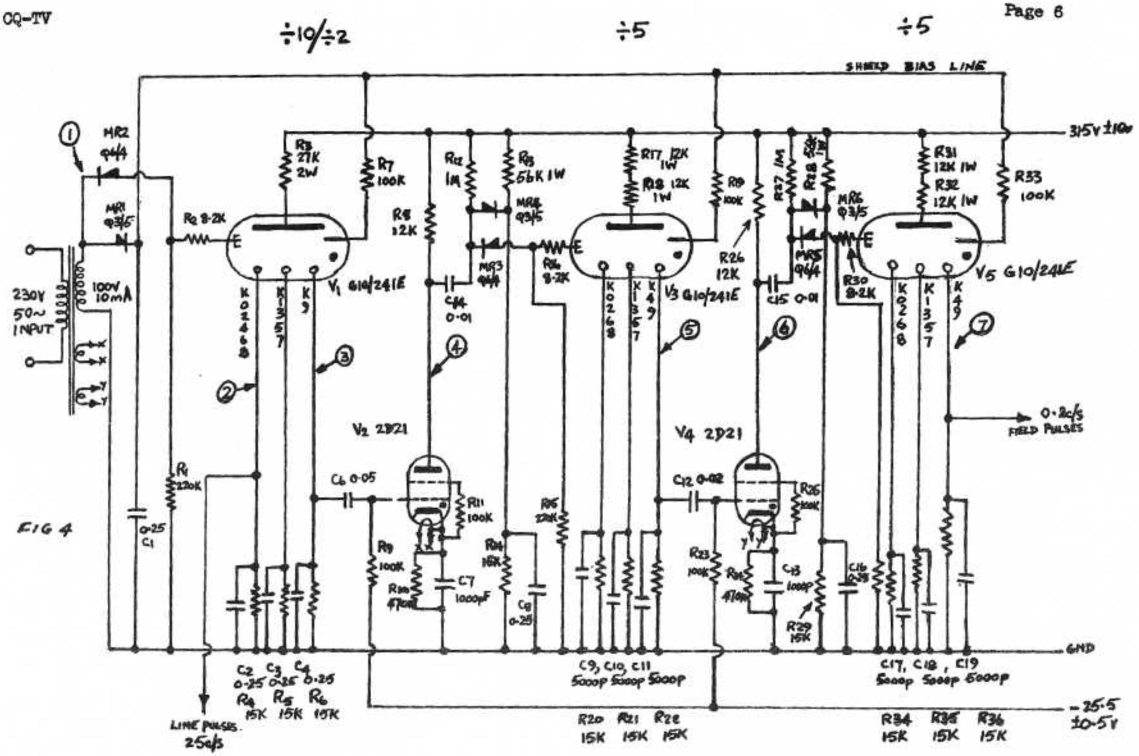


FIG 4

If a glow discharge be assumed between the anode and K_0, the potential between them will be the normal maintaining voltage of a gas-filled tube; the difference between this and the supply voltage will be the drop across the anode and cathode load resistors. Because of the special shape of the elctrodes the direction of the transfer is inherently unidirectional.

When a negative pulse is applied to the transfer electrode T_I, the glow is compelled to spread along this electrode as it has been primed by the discharge of K_0; and the fall in anode voltage (due to the increased current in the load resistor) extinguishes the glow at K_0. At the end of the negative pulse, T_I will return to its positive bias potential; and since K_0 is still positively biased, by virtue of the charge on the cathode capacitor at K_0, the discharge moves to the nearest unbiased cathode, i.e., K_I. At first the glow steps to the cathode "tail", but then rapidly transfers to the main body of the cathode, thus priming T_2 ready for the next transfer pulse.

In the circuit shown in fig. 4 the first Nomotron is driven by means of the 50c/s mains waveform. Thus it can be appreciated that the transfer pulse is long, (10mS). In order to achieve reliable operation the cathode time constant is also made long. (15K, 0.25µF). By taking an output from every other cathode (K0,2,4,6,8,) a 25c/s signal is obtained which can be used to drive the line time bases.

Note that the diodes shown are small copper oxide units - in case of difficulty use valve diodes - EB91, EA50 etc.

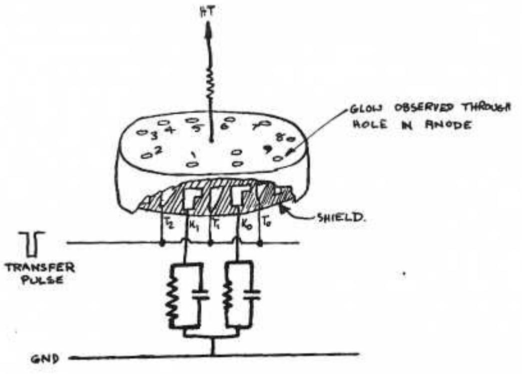


FIG I

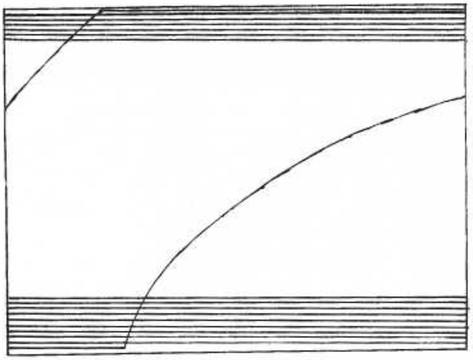


FIG 2.

The first division is by ten; it is obtained by bringing out one cathode (K9) and making the pulse derived therefrom trigger a short-duration pulse generator (approx. 12µS). The purpose of this is to keep the transfer pulse to the next Nomotron short, so that long cathode time constants are not required, and better pulse shape and reliability are achieved. The trigger circuit shown here uses an S.T.C. 2D21 hot-cathode thyratron, but there is no reason why a Schmitt trigger or similar circuit should not be used, provided it gives greater than 120V pulse amplitude and about 12µS width; and, of course, only one pulse out for one pulse in!

The waveforms shown are taken from a Tektronix type 545 oscilloscope, and are drawn to scale. A raster was made by triggering a 5 sec. sweep generator from the field pulse of the timer, using this to provide a Y signal for the oscilloscope. The X signal was provided by the internal sweep of the 'scope set to 4mS/cm over a 10 cm sweep length; this being triggered by the line output of the timer. The resulting 125-line raster has been drawn in Fig. 2. It can be seen that the flyback takes, in this case, about one line, and begins about one third along the last line. This gives a fair indication of the relative phases of the line and field pulses.

No jitter was detected between the line and field pulses, although the sensitivity of the measurement would have clearly shown a variation of ± 20µS.

It was found that with the thyratron-type pulse generators the bias was rather critical. It is suggested that this voltage is derived from a stabilized source as shown in fig. 3. All resistors in this bias circuit should be wire-wound. The H.T. supply is not at all critical, and may be obtained from an unstabilized supply. The current drawn is only about 20 - 25mA, but varies in sympathy with the slow pulses. Thus, if an unstabilized supply is used it is suggested that a large electrolytic capacitor be connected to the H.T. line to smooth out these variations. Care should be taken to ensure that the tolerance on the H.T. rail voltage can be adhered to despite mains variations, etc.

To keep to the ratings imposed by the manufacturer on the thyratron 2D21 it is necessary to connect the cathode to one side of the heaters, and to feed the valves from separate heater supplies. For this purpose a small transformer was wound giving the 100 volts for driving the first Nomotron and two sets of 6.4V at 0.6A. If cold-cathode trigger tubes such as the S.T.C. type G1/371K are used in the place of the thyratrons, heater supplies can be obviated.

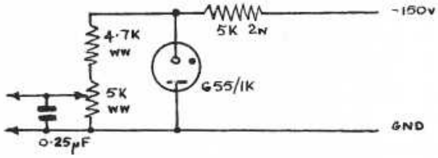
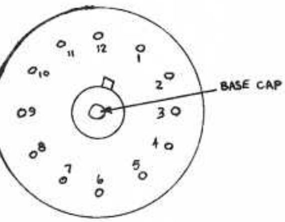


FIG 3



PIN Nº	
1	SHIELD
2	K_0
3	K_9
4	K_8
5	K_7
6	K_6
7	K_5
8	K_4
9	K_3
10	K_2
11	K_1
12	TRANSFER ELECTRODE

BASE CAP – ANODE

G10/241 E BASE CONNECTIONS

PIN Nº	
1	G_1
2	K
3	H
4	H
5	G_2
6	A
7	G_2

2D21 BASE CONNECTIONS

WHAT THE OTHER CHAP IS DOING

From Harry Grimbergen,PAØLQ, comes news of activities in the Netherlands ; he is occupied with the construction of a valve tester, a wide band CRO, and 70 cm measuring equipment, in addition to his work on the VERON technical commission. A.H.Lambriex PAØLAM has a vidicon camera and an image iconoscope, and "brews excellent picture quality". PAØSW has been experimenting with mechanical systems of facsimile on 2 metres. Founder member Hendrik de Waard, PAØZX, is now the technical manager for VERON.

Jeremy Royle, G3NOX/T, reports of his work with a 2 stub tuner on 70cm - the tuner was found to give a good improvement in signal/noise ratio at the receiver. Simon Freeman, G3LQR/T, near Colchester, has been hearing Jeremy on 70 cm. We hear from John Jull, now Hon.Sec. of the Cambridge group, that the group should soon be on the air ; at the time of writing, the aerial had still to be erected. There are no chimneys, so it has to be stuck through the roof - as John remarks, it is a complicated business ! They are using a 25' run of Telcon PT 11 cable.

Dave Jones, G3LYF/T, has now moved to Totnes, S.Devon, and would like to contact anyone in the area who is interested in ATV. He is building a timer unit and pulse generator ; a Test Card C monoscope is the next item. And after that, a vidicon camera - so Dave will be fully occupied for some time. He is able to provide information and application reports on such valves as 4X150/250, 5B/254M, etc. Thanks for the offer, Dave - and congratulations on your Grad.Brit.I.R.E.

Graham Hill, whose article on a monoscope unit appeared in CQ-TV 44, is now serving with the RAF and hasn't the opportunity for practical work. However, he is working out designs for parts of an image orthicon camera in the meantime. A brief word from Nigel Nathan, Andover, Mass. - work, exams and the family keep him busy at present, but he hopes to return to amateur TV sooner or later. Bill Stapleton, of Dublin, is another member whose work keeps him fully occupied, particularly with the coming of Irish TV.

G.S.Chatley, G3LOS/T, is still trying to arouse interest in Cheshunt,Herts. He has constructed a 70 cm converter using 6BQ7A as a grounded grid RF amplifier, and mixer/oscillator. He can transmit on 434-440 Mc/s with 13 watts ; can any members receive him ? J.V.Newson, G3GY, North Walsham, has been inactive recently, but hopes to resume soon. Tony Young of Bushey Heath is pressing on with his transistor pulse generator ; it is in the birds nest stage just now. Another member who is interested in the use of transistors is Ben Sedlack of Albuquerque, New Mexico ; he would like to get in touch with anyone using transistors in slow scan TV circuits. He has been thinking of using unijunction transistors as slow scan sweep generators, and silicon controlled rectifiers as count down dividers. Ben considers that the FM system of slow scan is the better. A.C.Bevington,G5KS, of Birmingham has been ill ; glad to learn you are now better, OM.

Malcolm Sparrow, G3KQJ/T, of Wolverhampton, has completed his 405 line interlaced pulse generator, and is now at work on his Test Card C monoscope. Gordon Couzens, G3NTA/T, of West Kirby, picked up a 420 Mc/s push pull oscillator for 2/6d when passing through London. It emloys two 6J6. He also noticed some altimeter test sets on the market, price 7/6d to 25/- depending on condition ; they incorporate a very fine 400-470 Mc/s wavemeter (grid leak detector) in them. The wavemeter is directly calibmated 10-70 ; when G3NTA/T spot chach spot checked his unit, he found it covers 410 to 470 Mc/s. The unit also contains an audio oscillator, a two stage audio amplifier and a meter.

Nick Pearson, Hon. Sec. of the radio group of E.E.Apprentices Association,Stafford, writes to say that they are re-building the vidicon camera, as the original version suffered from an overdose of parasites. Progress is necessarily somewhat slow as many of the group members are away on commissioning jobs, or occupied by exams from time to time. Norman Riggs of Ruislip will shortly be switching his FSS on for the first time. Dave Quigley, Cowes,I.O.W., is busy on the construction of the Bill Still scanner described in CQ-TV 35.

B.B.Ajayi is now in Ibadan, W.Nigeria, and hopes to encourage local interest in amateur TV, now that arprofessional service is in operation. P.J.Robinson, G3KFH/T, has completed his FSS and a 70 cm transmitter, and is now ready to stir up activity in Worthing. J.E.Rising is now in Melton Mowbray, building a 430 Mc/s receiver. He sends his regards to the boys around Chelmsford. Ian Harris of Edinburgh is visiting New Guinea for 6 months.

John Ambrose of Hemel Hempstead paid a 9 month visit to Australia, and met 8 of our members during his trip. He was able to see Eric Cornelius VK6EC, in Inglewood, and his equipment ; phoned Paul Jones, VK7PJ, in Tasmania ; and found Dr.I.C.Morrison and H.Scholy, both of Brisbane, very busy with the professional TV service. The most active member whom John met was Noel Mitchell o^ Wavell Heights, Brisbane. Noel's rig is composed of a 6198 vidicon with homewound coils and a 5" viewfinder ; synce pluse generator for CCIR 625 lines ; camera dolly with pan and tilt head ; and a 5" picture monitor with a waveform monitor. He has a 12' square

control room overlooking a 32' x 12' studio (a converted lounge) ! John is saving up to return to Australia on or before May 1962; try to visit our active members in and around Geelong, if you can do so, John.

Dave Freeman of Geelong is making a 288 Mc/s converter to feed his 17" set ; the next item is a FSS using a 5FP7 and a 931A. He has two 832A valves, and intends to build a 16 element stack when he obtains his licence. Stan Widgery VK3SE is in Ballarat, about 55 miles by air from Geelong ; he has a 3" FSS in operation, and hopes to modulate RF with it soon. His vidicon has arrived safely, so he have a second picture source. He hopes to carry out experiments from a Mount about 7 miles away, on the 288 Mc/s Australian amateur band, with the hope of reaching Geelong.

Warren Jacobs, VK6WJ, has been building himself a new house in Mount Yokine, W.A. It is complete with spare bedroom (i.e. amateur TV room!) Warren reports that 3FP7 CRTs are available in Australia now. (handy for FSS, or as slow scan TV viewing CRTs). Robert Vieira, Walton-on-Thames, is a newcomer to amateur TV, and would be pleased to contact anyone in his neighbourhood.

R.J.Moore, VE6RM, of Edmonton, Alberta, is another newcomer who would like to correspond with members who have built gear - Canadian members please note. He is building a FSS at present.

Warren Heaton, VK4GT, of East Ipswich, Queensland, has built two TV sets, and is completing his FSS. R. Monteil, F8UM, has built up a vidicon camera to John Tanner's design, and is awaiting his camera tube. R.Pittet is an American serviceman in Norway ; he reports a lack of activity on 70 cm in Oslo, but enjoys reading CQ-TV to keep in touch. Don Miller W9NTP and several of his friends in Indianapolis are very interested in slow scan TV. Bill Davies, Prestatyn, is about three miles from L. Barnes, and only a mile from John Lawrence, GW3JGA/T, though unfortunately there is a hill in the path to GW3JGA/T. They hope to experiment with TV relays, after Bill has taken out a /T licence in a few months. Deryck Aldridge of Newcastle has built up his pulse generator, and a VSB mixer, and has sent very helpful and detailed notes along, which we hope to publish.

This brings us up to date once again - don't forget to keep sending your news to us.

VIDICON DEFLECTION COILS

Direct T/V Replacements Ltd. are introducing a range of windings for low priced, closed circuit cameras. The first of these to be released is a deflection coil for use with Vidicon tubes.

Technical specification:

Field Winding. 36 amp/turn with a D.C. resistance of 110 ohms. The coils require 58mA peak to peak for full deflection. This winding may be connected directly into the field output stage without coupling transformer, providing a suitable circuit is used to prevent any standing D.C. in the coils.

Line Winding. 36 amp/turn requiring 300 mA peak to peak. Inductance 3mH. R= 10 ohms

Both windings are centre tapped.

These coils may be ordered through the B.A.T.C. and the price is £3 each. Orders to the Hon. Sec. Note also that a complete Vidicon camera channel is to be described in CQ-TV shortly, and the circuits are being planned with these coils in mind.

SLOW SCAN NEWS.

Narrow Band Image transmission system may be used on the 144 and 28 Mc/s bands. This is the news received from the G.P.O. recently. The permission is given for a trial period of two years, and a total of 12 stations will be permitted to use the system. These stations will have to be fully licenced Amateur (Sound), and the applications are being handled by R.S.G.B. through B.A.T.C. At the time of going to press G3AST, G3MED, G3CCH G2AFD, G3KCB, G3LEE and G2AS have applied for permission to transmit Narrow Band Images. No details are available about transmission frequences and times as yet, but these will be published as soon as possible. When transmissions start reception reports will be very welcome, and necessary to present a good case for widespread use of the system at the end of the two year test period.

Cover Photograph for this edition shows the picture that appears on Jeremy Royle's QSL cards. This shows the 64 element stacked array on top of the tower. The 64 element arrey is topped by a separate smaller array used for sound, or used for reception when the station is being used as a repeater station. Jeremy runs 150 watts peak white to a 4X150A, and his pictures have been received by many stations in East Anglia and Essex.

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